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metric system is a better system than the one we have, and knowing there is something better, we want to see its adoption made compulsory by congressional enactment at just the earliest moment commensurate with the demands of the electorate educated to its real value.

We urge the approval of the formation of an association whose object shall be to forward the metric system propaganda in the United States by both educational and legislative means and favor giving such an association our active, moral and financial support.

WHOLESALE DRUGGISTS AND THE METRIC SYSTEM

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ALL radical changes in old, established and well-known methods of conducting business are invariably looked upon with great disfavor. It can not be denied that alterations in the units of weights, measures of length and capacity, will cause some trouble and no little expense. New moulds for bottles, new packages, new labels and a radical change in prices will become necessary. All these troubles taken collectively may not be much greater than those that have been inflicted upon the druggists in recent years by the fatherly supervision of the officials in charge of the food and drug act. In addition to this, when the changes of the metric system have once been effected, they will not be subject to whimsical alterations, but they will then permanently conform to the established standards.

The well-known advantages of the metric system are its simplicity, its uniformity, its decimal characters, the convenient convertibility of one unit to another, the clear manner in which its nomenclature expresses exact values, and the security of its unalterable base.

The simplicity consists in there being only five units in the entire metric system, of which only three are used by druggists, namely,

The meter, or measure of length,
The liter, or measure of capacity,
The gram, or measure of weight.

Larger and smaller quantities are expressed by seven prefixes to these terms. Of these the Latin prefixes deci, centi and milli divide the unit, while the Greek prefixes deka, hekto, kilo and myria multiply the unit by the number indicated.

Thus, a milligram is $1/1,000$ of a gram, equal to about $1/65$ grain,
a centigram is $1/100$ of a gram, equal to about $1/7$ grain,
a decigram is $1/10$ of a gram, equal to about $1\ 1/2$ grains,
a gram is equal to about $15\ 1/2$ grains,

a dekagram equals 10 grams,
a hektogram equals 100 grams,
a kilogram is 1,000 grams, equivalent to about $2\frac{1}{5}$ avoirdupois pounds,
a myriagram equals 10,000 grams.

These equivalents are not strictly correct, but they are quite near enough for commercial purposes, and they are very much easier to remember than the exact decimal figures.

The above seven prefixes are likewise used for the liter and the meter, which they divide or multiply in precisely the same manner. The entire metrical system is therefore included in ten words, or, when the units of superficial area and cubical contents are added, in twelve words.

A rough and ready method of converting the most frequently used commercial unit into avoirdupois pounds is to multiply the number of kilograms by two, and then add ten per cent. Conversely, avoirdupois pounds can be changed to kilograms by dividing the number of pounds by 2.2. In the same manner, when quotations are asked for in kilograms it is only necessary to double the pound price, and then to add ten per cent. or to multiply the price at once by 2.2. For small quantities, only the gram is used as a unit. Although the actual equivalent of this is 15.432 grains, for practical purposes the decimal fraction may be dropped, so that then 4 grams will be equal to 1 drachm of apothecaries' weight.

In the writing of prescriptions in the metric system all the weights are expressed by Arabic numbers. No abbreviations are required, as the gram is always understood to be the only unit. Quantities less than a gram are written as decimal fractions. A vertical line is often printed on prescription blanks, so that whole numbers may be written on the left of this line, while decimal fractions are written on the right. In the absence of the printed line, the position of the decimal point can be clearly indicated by placing a "0" on the side where no figures appear.

The liter is the equivalent of a cubic decimeter. When filled with distilled water at its maximum density, it will contain 1,000 grams or a kilogram. Used as a measure of capacity, this is nearly 6 per cent. larger than the United States liquid quart. Our liquid measures can, therefore, be readily converted into metric measures by reducing them to quarts and adding 6 per cent.

The meter or unit of length is equivalent to 39.37 inches, being between 9 and 10 per cent. longer than our yard. The decimeter, or $\frac{1}{10}$ meter, a measure frequently used in botanical descriptions, is therefore almost equal to 4 inches. The centimeter has become quite familiar to druggists by the numbers used for French filters, which indicate their diameter in centimeters. One inch is very nearly equal to $2\frac{1}{2}$ centimeters, so that a No. 25 French Filter will have a diameter of

10 inches. The kilometer, or 1,000 meters, is nearly equal to $\frac{5}{8}$ of a mile.

The United States mints furnish very convenient metric weights in the shape of the dime, which weighs $2\frac{1}{2}$ grams, the 25-cent piece, which weighs $6\frac{1}{4}$ grams, the half-dollar, which weighs $12\frac{1}{2}$ grams and the nickel 5-cent piece, which weighs 5 grams and has a diameter of 2 centimeters.

As the metric system has been officially adopted and commercially used for many years in very nearly all civilized countries, except those in which the English language is spoken, almost all importers are already quite familiar with its various units, and with the most convenient method of converting them to our standards.

At the present time our manufacturers and exporters are seriously handicapped by their adherence to systems of weights and measures which have long since become obsolete among the more progressive nations. It would seem as though we were paying a heavy penalty for our slavish following of the bad example of England, which still demands that all the rest of the world shall bow down to her narrow insular prejudices. According to a pamphlet published by John W. Nystrom, C.E., England was about four hundred years behind the continental nations in the introduction of our present Arabic digits. He quotes many of the most absurd and truly ludicrous objections which were urged in England against the change from the clumsy Roman notations to the now universally employed Arabic decimal figures.

Quite a number of the more progressive German exporters have partly solved the problem by issuing price lists, in which English weights are quoted in both pounds, shillings and pence, as well as in dollars and cents, while on other price lists metric kilograms are quoted in francs, lires, pesos or marks.

John Quincy Adams fully recognized the supreme importance of simplifying the science of metrology, concerning which he said:

Uniformity of weights and measures, permanent universal uniformity adapted to the nature of things, would be a blessing of such transcendent magnitude that, if there existed on earth a combination of power and will adequate to accomplish the result by the energy of a single act, the being who should exercise it would be among the greatest benefactors of the human race. . . . The French system embraces all the great and important principles of uniformity, which can be applied to weights and measures. . . . It is a system adapted by the highest efforts of human science, ingenuity and skill, to the common purposes of all. Considered merely as a labor-saving machine, it is a new power offered to man, incomparably greater than that which he has acquired by the agency, which he has given to steam. It is in design the greatest *invention* of human ingenuity since that of printing. . . . Its universal establishment would be a universal blessing.

In reference to the nomenclature of the metric system, Charles Sumner said:

A system intended for universal adoption must discard all local or national terms. The prefixes employed are equally intelligible in all countries. They are no more French than they are English or German. They are in their nature cosmopolitan and in all countries they are equally suggestive in disclosing the denomination of the measure. They combine the peculiar advantages of a universal name and a definition. . . . The name instantly suggests the measure with exquisite precision. . . . An afternoon would suffice to make the metric system plain to a class of school boys.

Superintendent Philbrick, of the Boston Schools, writes:

Of all the great problems bearing on the progress of civilization, which have in recent times engaged the attention of legislators and men of science, few are more important or far-reaching than that of the unification of weights and measures. To the speedy and complete solution of this problem of universal interest every community is bound to contribute according to its circumstances and ability. The grand aim of the metrological reform is comprised in three words, *uniformity, permanency and universality*; one standard to be the same for all persons and all purposes, and to continue the same forever. . . . A universal system of metrology should possess the following four characters:

1. Its base-unit should be a common measure of all its derivative units.
2. Its derivative units should increase and decrease by the decimal scale.
3. Its denominations should be expressed by convenient, definite and significant terms.
4. Its standard unit should be invariable and indestructible or reproducible.

This ideal perfection exists in the metric system, which France, acting as the representative of mankind, has invented and offered as a benefaction to the acceptance of all nations.

In conclusion it may be well to call attention to the prototype of the metric system, the one that we are using hourly, namely, our United States coinage of mills, dimes, dollars and eagles, all of them having the exact decimal relation to each other as the units of the French metric system. Without a doubt, when our business men have familiarized themselves with the terms and relative values of the metric system, they will find it to be just as infinitely superior to the perplexing English tables of weights and measures, as our convenient decimal dollars and cents are superior to the troublesome pounds, shillings, pence and farthings. Our successors will then express no little surprise that the druggists of the United States did not fully adopt the metric system for more than a century after its invention in France.

Joseph W. England, in a paper recently published by him in the *Journal* of the American Pharmaceutical Association, gives that which is probably the most practical advice of all to the druggists, both wholesale and retail, in the terse and pithy remark, that the proper and only way of introducing the metric system into this country is to stop lecturing, writing or talking about it, and at once begin actually to use it in the purchase and sales of drugs, in the manufacture of pharmaceu-

tical preparations and chemicals, in the compounding of prescriptions, and in the export and import of drugs and other commodities.

In still more forcible language, Dr. A. L. Benedict, of Buffalo, in the *New York Medical Journal* of April 29, 1916, calls for "the prompt and universal adoption of the metric system, at the cost of temporary inconvenience and contrary to habit, of something that is ultimately desirable and economic."

Even England is at last beginning to recognize the fact that the retention of the antiquated weights and measures will act as an obstacle to her trade in the future. Xrayser, in *The Chemist and Druggist* of May 13, 1916, says:

Not till our purchases are made by metric system of weights and measures shall we really become so familiar with the metric system as to introduce it in sales. In view of the future of our *world trade*, the sooner we adopt the system throughout, the better for us.

Professor E. G. Eberle, in a very able article in the July, 1916, number of the *Journal* of the American Pharmaceutical Association, expresses himself thus:

The attempt at aligning this system with the old should be discouraged in every possible way, because this one is not developed from the other. Think in the metric system, weigh and measure the quantities with the metric weights and measures, and very soon the senses of seeing, hearing and feeling will do their part, without noticeable effort of the mind. By this is meant, that seeing the written denomination, or hearing it spoken, the volume or weight will at once be associated therewith; just as is the case with those who are now experienced in the old system and who lack the same familiarity with the metric.

Inasmuch as two of our legal standards, namely, the United States Pharmacopoeia and the National Formulary make use of the metric system exclusively, the members of the National Wholesale Druggists Association should certainly be leaders in the movement for the universal and exclusive use of metric weights and measures. Nothing would do more to stimulate its employment among retail druggists than to compel them to purchase their supplies in this manner, so as to gradually abandon altogether the present custom of purchasing drugs by avoirdupois weights, compounding prescriptions by troy weights and wine measures, and making up official preparations by still another standard.